Battlespace Systems Support Directorate Bulletin

July 2003
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"Serving the Needs of the Battlespace Systems Community"

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*The **BSSD Bulletin** is published quarterly under supervision of the Director, U.S. Army Communications Electronic Command (CECOM) Software Engineering Center (SEC), Battlespace Systems Support Directorate to provide DOD, military and civilian personnel information on technical development, issues and ideas of and about the Directorate. The views and opinions expressed are not necessarily those of the Department of the Army, CECOM or the SEC.*

SEC Guardrail Branch Supporting 15th Military Intelligence Battalion (AE) in Southwest Asia

Submitted by Hoa Diep, CECOM SEC

The 15th Military Intelligence (MI) Battalion (Bn) (AE) Guardrail/Common Sensor System 2 (GR/CS System 2) Airborne Segment was deployed forward in 2002 in support of Operation Enduring Freedom (OEF), and has been providing Central Command (CENTCOM) with critical Signal Intelligence (SIGINT) collection during the recent build up of forces. In September 2002, the Software Engineering Center (SEC) augmented its support of the 15th MI Bn (AE) by placing an Airborne Segment Field Software Engineer (FSE) at Fort Hood, Texas. The SEC FSE was requested to deploy forward with the Airborne Segment to provide software and computer/network-related support to operations and maintenance functions. The SEC FSE has been in Southwest Asia since late January 2003 performing this critical function.

Supporting the Maintenance Cycle and Pre-Flight Cycle for seven to eight Guardrail payloads (Airborne Relay Facilities) makes for long days and long weeks, but SEC is providing a software expertise "bridge" among the Unit's electronic warfare technicians (MOS 33's), support personnel from Tobyhanna Army Depot (TYAD), and various contractor personnel from L3-Com and Northrop Grumman/Mission Systems.

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Guardrail Branch Embraces Lean Thinking for PPSS

Submitted by Hoa Diep, CECOM SEC

The Configuration Management Build Environment (CMBE) was established by the Software Engineering Center (SEC), Avionics/Intelligence and Electronic Warfare Division (A/IEWD) for Post Production Software Support (PPSS) of the latest and most software intensive Signal Intelligence (SIGINT) system in the Army's inventory, Guardrail/Common Sensor System 2 (GR/CS System 2). CMBE is the first SEC Configuration Management (CM) and software test environment designed for collaboration among geographically dispersed users, multiple contractors, and government experts. This design fosters an efficient use of specialized technical expertise, facilities, and other resources with the attendant productivity improvements brought about by information exchange in the collaborative team environment. It is a great example of Lean Thinking at SEC.

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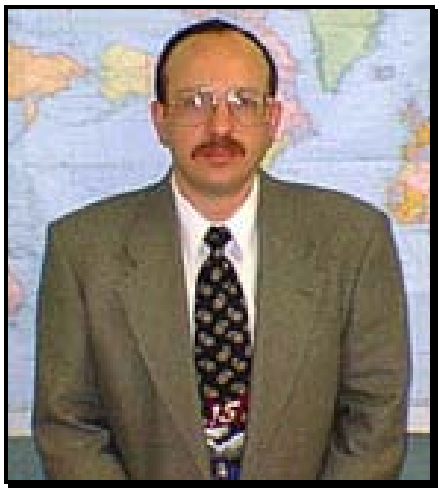
From the Senior Editor's Desk
Motivation

Commentary By Joseph Ingrao, Deputy Director, Battlespace Systems Support



Leaders search for opportunities for people to exceed their previous levels of performance. They regularly set the bar higher. However, leaders should also appreciate that the challenge shouldn't be so great as to be discouraging. This awareness of the human need for challenge and this sensitivity to the human need to succeed at the challenge are among the critical balancing skills of any leader. According to a traditional organizational cliché, what gets rewarded gets done. So organizations generally offer a lot of extrinsic rewards (i.e., money). If extrinsic rewards explained all our behavior, we would be hard pressed to find an explanation for all of the overachievers we have today in the US Armed Forces.

We believe that intrinsic motivation must be present if people are to do their best. We believe that what is rewarding gets done. We can never pay people enough to care; to care about their products, services, communities, or families. True leaders tap into people's hearts and minds, not merely their hands and wallets.

If external rewards and punishments are successful, why should leaders concern themselves with these intrinsic rewards? After all, people in the workplace aren't volunteers; they're getting paid. It's precisely because people are getting paid, because people are eligible for bonuses and the other awards, that a leader ought to be concerned. If work comes to be seen solely as a source of money and never as a source of fulfillment, organizations will totally ignore other human needs—needs involving such intangibles as learning, self-worth, pride, competence, and serving others. Employers will come to see people's enjoyment of their task as totally irrelevant, and they will structure work in a strictly utilitarian fashion. Without employing peoples' hearts, organizations lose precious return on their investment in people. Absolute dedication to extrinsic motivators severely limits an organization's ability to excel and use the full potential of its employees.

Whether it's doing our best as leaders or simply enjoying what we do, answering the summons of adventure lifts our sprits. Being invited to do better than we've ever done before compels us to reach deep inside and bring forth the adventurer within. ■

FSSEC Road to CMMI Level 5

Submitted by Philip Sterling, Telos

In November 1990, the US Army Material Command (AMC) began an affiliation with the Software Engineering Institute (SEI). The purpose of this affiliation was to generate methods to continually improve the software engineering capability of all US Army software development agencies.

The SEI introduced AMC to the Software Engineering Capability Maturity Model© (CMM©), which provides a model of software engineering key practices accepted by the software industry. AMC selected the Communications Electronics Command (CECOM), Software Engineering Center (SEC) to take the lead in implementing the methods associated with this model. The SEC subsequently selected the Fire Support Software Engineering Center (FSSEC), which is located at Fort Sill, Oklahoma, to initiate formal software engineering process improvement in accordance with the guidelines set forth in the CMM.

FSSEC began by establishing a benchmark activity, in order to determine its current state of software engineering maturity, as described in the CMM in terms of Maturity Level 1 through Maturity Level 5. This appraisal was conducted in February 1991, and identified the organization as a CMM Level 1 with a large portion of the CMM Level 2 Key Practices in place. This appraisal was conducted by members of the local FSSEC, Telos·OK (prime contractor), CECOM, Mitre, and the SEI.

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Safwan Crew

"The Jarheads are doing well. We have a MAWTS-1 guy with this gang also. Tough fighting, but ASE seems to be doing its job! Thanks to all of you who ensure our ASE works how it's supposed to when it's supposed to!"

LtCol. M.J. Smith-Meck, USMC

The Joint Tactical Radio System: DoD's Next-Generation Radio

Submitted by Coleen Coughlin, CECOM SEC

The Joint Tactical Radio System (JTRS) program was established to acquire a family of tactical radios to provide interoperable Command, Control, Communications, Computers, and Intelligence (C4I) capabilities to the Warfighter. Historically, each Service has introduced unique communication systems to accommodate individual mission needs. These stove-piped systems wasted bandwidth, used non-interoperable protocols, and often used proprietary software/firmware. Experience during Desert Shield/Desert Storm accentuated the fact that seamless communications among deployed troops was problematic. JTRS will enable improved communications capability for Joint/Coalition Operations and Homeland Defense.

The Department of Defense (DoD) established the JTRS Joint Program Office (JPO) to procure the Joint Tactical Radio Sets that will replace the DoD inventory of 25 to 30 families of radios with a single radio family. While the JTRS radios will be functionally backward compatible with the legacy systems, the goal is to reduce the dependence on and ultimately replace legacy waveforms (signal formats that radios are designed to read). The inclusion of commercial waveforms will enable support to Homeland Defense.

Office of the Under Secretary of Defense (OUSD) Acquisition, Technology, and Logistics (AT&L) has structured the program to include multiple acquisition Clusters. The Army was designated the JTRS Executive Agent. The JPO is a direct reporting Program Manager (PM) to the Army Acquisition Executive, and the JPO in that capacity provides oversight and guidance to the Clusters. The PM Tactical Radio Communication Systems (TRCS) at Fort Monmouth has been selected as the project lead for JTRS Cluster 1. Cluster 1 acquisition is divided between PM TRCS and JPO. PM TRCS is the lead Service Program Management Office to procure JTRS Cluster 1 radios to meet ground vehicular and rotary wing requirements. JPO is responsible for developing and validating a standard Software Communications Architecture (SCA) in support of waveform software. JPO will acquire the waveforms that are SCA compliant through the Cluster 1 contract and will also acquire any remaining waveforms (legacy and future) to support future Clusters. The JTRS Cluster 1 contract was awarded on 24 June 2002 to a team led by The Boeing Company with a period of performance lasting to 2008.

JTRS Cluster 1 is the first ACAT 1D US Army program to be awarded in five years. The acquisition concept for JTRS Cluster 1 consists of a System Development and Demonstration (SD&D) Phase and a Production and Deployment Phase. The SD&D Phase of the acquisition is a Cost Plus Award Fee contract with a Low Rate Initial Production (LRIP) option. The SD&D Phase uses The Boeing Company as the prime system contractor for the development and integration of hardware and software waveforms. Boeing has teamed with BAE Systems and Rockwell Collins as hardware vendors to ensure multiple sources and will develop or subcontract out for the development of software waveforms. The SD&D Phase is scheduled to end by 2QFY06 with the completion of Government Developmental Testing and a Limited User Test. Early Operational Assessment (EOA) will be conducted in August 2004 to evaluate functional performance and maturity of both hardware vendors. The results of EOA will serve as the basis for exercising the LRIP option.

The mission of JTRS Cluster 1 is to provide the Warfighter with a software-reprogrammable, multi-band/multi-channel, networkable system that provides simultaneous voice, data, and video communications to increase interoperability, flexibility, and adaptability in support of varied mission requirements. The objectives and goals of JTRS Cluster 1 are interoperability via common waveforms, portability of waveforms, technology insertion, and robust connectivity through cross banding of information across and between networks, network-centric communications, and enabling information dominance. The Cluster 1 software is categorized into Waveform Applications, Operational Environment Applications, Radio System Applications, and External Software Applications. CECOM Software Engineering Center (SEC), in support of PM TRCS, has the primary responsibility for all non-waveform software.

SEC provides overall software support and expertise to PM TRCS, primarily through our leadership role on the JTRS Software Management Working Group (SMWG). The SMWG is chartered as the PM TRCS JTRS software support interface with external organizations, including the JPO and OUSD (AT&L).

SEC representatives from the SMWG participate on various Working Groups and Integrated Product Teams to foster cross-functional working group relationships throughout the JTRS Cluster 1

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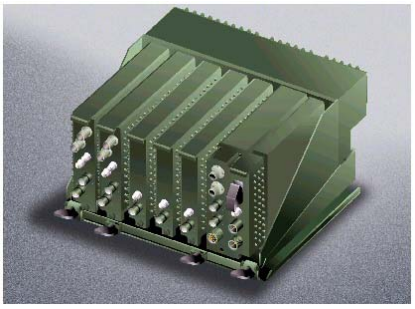

community and serve as the primary reviewer of all software Contract Data Requirements List documentation for Radio Systems Applications, Operational Environment Applications, and External Software Applications. SEC also conducts the contractual activities related to the Software Engineering Institute's (SEI) Capability Maturity Model© Integration℠ (CMMI℠) assessments. Representatives from SEC BSSD and SEC OPS have teamed with the major developers on the Boeing Team to perform self-assessments of the Cluster 1 developers. These joint Government/Industry assessments are a pilot for what may be a future method of evaluating potential contractors on major acquisition programs.

Leveraging off of SEC's expertise in process improvement, SEC identified, developed, and applied key software and program management processes and procedures based on the Software Capability Maturity Model (CMM©), the Software Acquisition CMM, and the CMMI. Several of the processes established by the SMWG are becoming the standard on Cluster 1 and are being considered for use throughout the JTRS community. Areas where SEC has taken the initiative include the following:

Project Planning. SEC established a template for Cluster 1 milestone plans (e.g., Software Specification Review, Preliminary Design Review, Critical Design Review) that has been adopted for all Cluster 1 milestone reviews (system, hardware, and software).

Contract Data Requirements List (CDRL) Review Process. The SMWG, in conjunction with JPO's WMWG, developed a document review and comment consolidation process that is being used on all Cluster 1 formal deliverables.

Software Measurement. SEC developed the Software Measurement Plan (leading, lagging, and coincidental metric indicators vs. cost, schedule, and performance objectives) which contributed to the Milestone Decision Authority's (MDA) program approval authority for JTRS Milestone B. SEC continues to work with the Boeing Team to gather and analyze key metrics as management early warning indicators and quantitative indicators of progress toward program cost, schedule, and technical goals.

Risk Management. The SMWG established a Software Risk Management Plan to include both waveform and software risks. The document defined key processes and objectives to assuring PM-wide control on high software risk areas. SMWG representatives participate in quarterly Risk Assessment Board meetings and provide input to the Risk Management Plan and AAE risk updates.

Independent Verification and Validation (IV&V). SEC developed an IV&V Plan and a Software Quality Management Plan outline to document the activities required on the program. These plans will serve as a baseline for development of future JTRS Clusters.

Software Development Folders (SDFs). The Cluster 1 contract calls for remote access to the major developers' SDFs. The SMWG and WMWG will use this capability on a noninterference basis to gain further insight into the developmental progress and engineering decisions of the contractors.

SEC's Replication, Distribution, Installation, and Training branch has also provided support to JTRS in demonstrating its products and services to PM TRCS and JPO for use throughout the JTRS program. SEC will continue to support future activities to include document review, Earned Value Management System analysis, supporting milestone reviews, performing metrics analysis and risk management, and all JTRS system testing. ■

TAS—Mobile Training Team Executive Summary

Submitted by Julia Taylor, CECOM SEC

The CECOM/ILEX Mobile Training Team (MTT) provides high quality, realistic, "Battle Focused" training on the Army's All Source Analysis System (ASAS) and its subcomponents to military and DoD intelligence analysts. The primary focus of this training is to produce analysts who can effectively leverage ASAS to help satisfy the commander's intelligence requirements. Since the most important factor in using ASAS effectively is analyst proficiency, MTT instructors emphasize the basic tenants of intelligence analysis throughout each block of instruction. The team seeks to improve analyst proficiency on three levels: (1) *analytical skills* (primarily MOS skills), (2) *threat knowledge* (to include enemy order-of-battle, weapon systems, tactics, etc.), and (3) *ASAS skills* (system functions and interoperability). Last year, the MTT trained approximately 500 military and civilian analysts from over 40 different intelligence Units/organizations. Customer feedback has been extremely positive. The benefits of having a transportable group of ASAS Subject Matter Experts who can provide on-site training (field and garrison), as well as mission integration assistance to our customers, make the MTT a highly effective solution to the ever present "sustainment training" challenge that most Military Intelligence Units face.

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Communication Systems Control Element (CSCE):

A Successful Transformation Story Performed by the Software Engineering Center Post Production Software Support Team

Submitted by Kathy Bogner, CECOM SEC

Abstract. The Communication System Control Element (CSCE), AN/TYQ-30-31, was an antiquated, shelter-based, VAX network management system that CECOM Software Engineering Center (SEC), in conjunction with the Logistics Readiness Center (LRC), evolved into a modern server-client, web-based, PC solution. The new hardware platform, any moderate-end laptop, is radically smaller in footprint and weight. Logistics have been significantly reduced and the reliability of both the hardware and software has dramatically increased. The redesigned software has a Windows look-and-feel making it familiar and much simpler to operate, thereby decreasing the learning curve for the Warfighter. The new software is flexible to meet the ever-evolving conditions in the battlespace. The software strives to decrease the network engineering, installation, operation and maintenance burden on the Warfighter while increasing the situational awareness.

Introduction. Replacing S-280 shelters with a laptop? That is the reality brought about by SEC's Post Production Software Support (PPSS) team working in conjunction with the LRC. By building off the lessons of the past, and leveraging the technology of today, SEC's PPSS team is able to provide cost-effective solutions for tomorrow. The CSCE is a prime example of the valuable services SEC can provide the Army through its PPSS programs.

History. CSCE, developed in the 1980's, was based on the mainframe workstation technology of that era. First deployed in 1989, over one hundred CSCEs were fielded worldwide, at Echelons Above Corp (EAC) Army Signal Commands, Brigades, Battalions and Companies. CSCE's mission was to provide tactical communications planning, engineering, management, and control of the circuit switch, message switch, and multi-channel networks. CSCE processed, interpreted, and distributed network status and performance data and provided automated data communications, storage, retrieval and manipulation. Nomenclatured the AN/TYQ-30(V)1, 30(V)2, and 31, CSCE consisted of a varying number of shelters, but on average two shelters were required per site for system operation. Within the shelters, mainframe VAX 3100s and dumb terminals were housed and it was upon this platform that the CSCE software operated.

CSCE was fielded, trained, and used throughout the Army in the early 90's. SEC, first working with the development Program Manager and later with the LRC, provided PPSS support. Periodic software releases were fielded to fix problems and provide the functionality required by the Warfighter to perform his mission.

In the mid 90's, the PC revolution was in full swing and the major computer manufacturers were rapidly dropping support for older mainframe-based systems; they were more interested in the hot new field of desktop computing. As the 90's progressed, getting spare parts for CSCE's archaic VAX hardware became increasingly difficult, costly, and for some components, impossible.

During this hardware revolution, a software revolution was occurring too, with old, textual applications being replaced by sleek, graphical user interfaces. New software packages were written to run on the PC, not the older mainframes. Icons replaced the written word. SEC did its best to maintain the CSCE software and to continue to add the functionality required to keep pace with the evolving battlespace. But limited budgetary resources, hardware unable to support software growth, expensive commercial off-the-shelf (COTS) license maintenance fees, and outdated software seriously hampered the effort. As a result, the software became increasingly slower and cumbersome to operate and user acceptance of the system waned.

This was also the period of downsizing within the Army. Fewer soldiers and high turnover rates made training and operational readiness a challenge for Signal Units. The Army wanted to do more with less. It wanted software that was easy to train and operate, and did not put an unrealistic burden on a Unit's dwindling human resources. It wanted systems with smaller footprints that were easier to air lift. CSCE Units were no different. They did not want to drag multiple S-280 shelters to the field, especially ones containing 1980's textual-based software. SEC saw more Units leaving their shelters in the motor pool and moving back to "sneaker" and "white-board" network technology.

It became obvious to SEC that another way to maintain the CSCE had to be found. SEC's PPSS team set out to find a solution that kept the CSCE functioning and providing modern network management capabilities to the Warfighter. The solution had to address hardware, software, training, and logistical concerns while being cost effective. SEC met with the system manager, the LRC, to discuss the future of CSCE, and a course of action was charted.

Remote VAX Workstation

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The Process. As with designing any good product, the first step was to survey the customer—that is, the Warfighter. SEC invited users from the CSCE Units to a meeting to discuss the true requirements of the next-generation CSCE. It made no sense to rotely take software of the 80's and try to make it support the battlefield of the new century. The users were asked to look at all the functionality in the CSCE and rank it from most important to least important. This allowed SEC's PPSS team to develop the improved software in stages that stayed within limited PPSS budgets. No promises were made to replace every piece of functionality in one shot. The philosophy was to start with the most important functions and work down the requirements list in future versions. As the old CSCE could barely support the modern battlefield, the Warfighter deemed this incremental functionality fielding solution acceptable. Using the information gathered from this event and the data garnered from the CSCE field service representatives, SEC's PPSS team set about to develop a modernized CSCE.

The Solution. The LRC, the system manager, developed and implemented a methodology to replace the old VAX hardware with state-of-the-art laptops. The Warfighter received a smaller, faster, more powerful platform and the Army achieved a greatly reduced, more cost-effective, logistics train.

SEC's PPSS team rose to the challenge of providing new state-of-the-art software that would be able to keep pace with the ever-evolving requirements of the battlespace while still remaining cost-effective to maintain. A spiral development model was used to develop the code. Prototype software was trialed at data exercises where performance factors and user acceptance were gauged. This process allowed SEC's PPSS team to test preliminary software versions in a non-static environment thereby catching design flaws early in the development cycle. This model also provided the ever-important user feedback at points where changes to the code could be made without affecting cost and schedule.


New PC Solution

Fielded in 3QFY01, the first implementation of the CSCE conversion was a partial VAX, partial PC solution. Command and Control was moved to the PC, which allowed the Unit to do planning in the garrison on the VAX, while only taking the smaller PC to the field for monitoring. In 4QFY02, the first all PC-based CSCE was formally tested, accepted, and fielded. The Warfighter acceptance of the redesigned CSCE software has been very positive. Units that have not used CSCE for years have come back into the fold and requested training and exercise support. The software has been successfully used in numerous exercises to include Grecian Firebolt, Bright Star, Ulchi Focus Lens, and Reception Staging Onward-Movement and Integration exercise.

The Redesign. So what is the CSCE today? It is a client–server architecture that operates on PCs. PC servers discover and synchronize with each other directly in a network of peers. The web-based client provides a decentralized, real-time collaborative planning capability. By using a web-based client, CSCE can run from diverse locations via any browser with little or no setup.

The user interface is graphically oriented with a minimum number of forms. Actions are performed via drag and drop, which dramatically improves ease-of-use: The software is easy to use thereby reducing the training and retention burden on the Warfighter.

The software contains a "Cold-Start" list, which has been populated with existing EAC and Echelon Corp and Below (ECB) equipment. However, the software has been designed in such a way that the Warfighter in the field can modify this list. The Warfighter can easily add newly issued equipment and COTS equipment purchased by the Unit to the equipment inventory. This flexibility allows the CSCE to keep pace with the evolving battlespace and allows the software to be used in Joint and Allied missions.

The equipment and network ownership features of the software can be used to limit, by Unit, the scope of network design and control. For example, the software can be configured to allow a network designer or controller from 11th Signal Brigade only to affect that portion of the network tasked to its Units and Units assigned to the brigade for the mission. When laying out a network design or entering a status, only equipment or portions of the network assigned to the 11th Signal Brigade could be modified. If an attempt is made to use, change, or design with assets from other Units not in the task organization of the 11th Signal Brigade, the software would prevent it. This flexibility allows the overall network manager to either tightly or loosely control his network depending on the current mission scenario.

Decentralized, real-time collaborative planning, combined with the equipment and network ownership features, provide the flexibility and control needed in modern communication networks. The CSCE software provides the communication community with a tool to assist with communication network planning, engineering, and management from concept to completion.

SEC's PPSS team has succeeded in taking a network management system, antiquated by time and technology but still required in the battlespace and replace it with a revitalized system through the use of modern software technologies. Software is the driving force and challenge behind today's Army readiness and tomorrow's force transformation. SEC's PPSS team stands ready to ensure that the Army meets that challenge. ■

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FSSEC immediately developed and implemented a plan for process improvement, which focused primarily on key practices associated with organization and system level process documentation, personnel training, managing process improvement, and technology innovation. The implementation of this plan was completed in September 1994, and FSSEC conducted its second benchmarking activity. This appraisal was conducted by members of the local FSSEC, Telos·OK, CECOM, Mitre, and the SEI. The actual appraisal methodology had become significantly more rigorous over the past three years, however, the organization was appraised at a solid CMM Level 3. This was the first time that any organization affiliated with the SEI had moved from Level 1 to Level 3 without an interim appraisal of Level 2. The Level 3 placed FSSEC in the top 15% of software development outfits around the world.

Subsequent to this second appraisal, FSSEC refined its process improvement plan to move to the next maturity level (Level 4). The refinements to this plan focused primarily on the establishment of a viable management-through-measurement program. The key attribute of a CMM Level 4 organization is its ability to quantitatively control the process performance and product quality of its software development efforts. There were no other Level 4 organizations in the world, and it took quite a bit of study in order to gain an adequate understanding of what the CMM actually intended with its Level 4 Key Practices. The SEI and Lockheed-Martin provided excellent guidance and assistance in identifying methods and means for FSSEC. The implementation of the process improvement plan was completed in November 1997, and the third benchmarking activity was conducted. It was during this appraisal that FSSEC was identified as meeting the criteria for CMM Level 4. This appraisal was conducted by members of the local FSSEC, Telos·OK, CECOM, Lockheed-Martin, and the SEI. This newest rating placed FSSEC in the top 2% of software development agencies around the world.

Since the advent of the original AMC initiative for process improvement, thousands of organizations and projects around the world have instituted formal software engineering process improvement programs. None have been as successful as that at the FSSEC, Fort Sill location. FSSEC has found that a significant return on investment has been realized through increased product quality (reduced defects) and the ability to perform much more work with the same workforce (decreased cost to the customer).

FSSEC is now implementing plans to improve its current Level 4 process and advance toward Level 5. Additionally, we are doing this under the newest model available in industry, the Capability Maturity Model Integrated (CMMI[SM]). This new model provides for an integration of software and systems engineering. Level 5 means that process improvement is a "way of life" for an organization. Improvements flow naturally from the workforce, and through the exercise of the organization's development processes. Key attributes of a Level 5 organization are predictability, efficiency, and high quality. This Level 5 benchmarking activity is scheduled to be conducted at the end of July 2003. ■

ANVIS HUD Universal Test Set

Submitted by Kwok Lo, CECOM SEC and Vincent Kurdyla, Sensors Technology

US Army Communications-Electronics Command (CECOM), Software Engineering Center (SEC) and its contractor Sensor Technologies has the responsibility for the Post Production Software Support (PPSS) of the Aviator Night Vision Imaging System/Heads Up Display (ANVIS/HUD, a.k.a. AHUD for short) system. When this system was transitioned to SEC, there was no available test system to support functional testing. An Aircraft Training Simulator (ATS) was borrowed from the US Army Aviation Logistics School (USAALS) at Fort Eustus, Virginia. With some enhancements and additional external equipment connected to the ATS, a PPSS environment with nearly complete functional testing was created. However, this system was somewhat unwieldy, and not easily moved or transported.

To enhance its PPSS environment and provide complete functional testing capability, CECOM SEC in a joint venture with Program Manager (PM), Night Vision ESD have designed and developed a portable system called the Universal Test Set (UTS). In addition to use in the PPSS lab, which has been set up in Bldg 1210 CEL 1, the UTS can be used in a logistics repair center, an avionics repair shop, or in a hangarred aircraft to test and evaluate the operational readiness of the AHUD Signal Data Converter (SDC). Plans are being made to promote and market this UTS system to logistics and training organizations.

The AHUD was developed to improve combat and assault military helicopter operations and survivability in the modern battlefield. It collects and displays critical flight information from aircraft sensors and converts it into visual imagery. The system allows continuous "heads-up" flight without the need to continuously look down at the cockpit instrument panel.

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TOP TEN Reasons Why "We Can't Get MSEWDDS Access"

Submitted by Roy Williams and Jim Harrison, ARAT-TA

(A slightly irreverent and absolutely unofficial look at Reprogramming. The opinions expressed are strictly those of the authors and do not reflect US Army policy.)

The personnel at the Communications Electronics Command, Software Engineering Center, Electronic Combat Branch (CECOM SEC ECB, aka ARAT CECOM) and the Army Reprogramming Analysis Team–Threat Analysis (ARAT–TA) talk with Electronic Warfare Officers (EWOs) and TACOPS at aviation Units around the world on a daily basis. After almost 10 years, we think we've heard most of the reasons why a Unit does not have the most current Mission Data Set (MDS) in its APR-39 Series Radar Signal Detecting Sets (RSDS). If you don't have the "latest and greatest" MDS, maybe some of our answers to the Top Ten excuses we've heard will help solve your problem. Contact numbers and email addresses can be found on page 15 of the bulletin.

10. "I can't get computers for accessing the Multi-Service Electronic Warfare Data Distribution System (MSEWDDS) or for reprogramming."

If your Unit doesn't have the bucks to buy you a dedicated laptop, try requesting a "Free" (read recycled) Government computer. Get on the Internet and point your browser to

`http://www.disa.mil/cio/darmp/excess. html - excess%20files`

You do not need a state-of-the-art system to reprogram and you can get by with only one computer, preferably a laptop.

9. "I can't get a Secure Telephone Unit (STU)."

This one can be tough—STUs are being retired and replaced with Secure Telephone Equipment (STE). You can learn everything you need to know about STEs by going to

`http://ste.securephone.net`

If you can't purchase a STE, how about checking with other organizations on the post or other nearby military facilities for access? You don't have to own it, just be able to use it periodically. If you can't get access to a STU or STE, Secure Internet Protocol Router Network (SIPRNET) access is another possibility that is even better! The nearest Military Intelligence Unit will most likely have SIPRNET access.

8. "I'm waiting to get our STU rekeyed."

Getting a rekey shouldn't take as long as building a freeway. Rock the boat. Tell the S2 it is mission essential. Depending on where your next mission is, it might be quite essential.

7. "I don't have an MSEWDDS account."

The application is pretty simple and straightforward. It can be faxed. Need a sample? Call or email us and we'll get one to you immediately.

6. "I'm waiting for DDS account approval."

There's been a misunderstanding. When you submit your application form, you can log on and create your new account. You should have full access to the DDS about 24 hours later. We'll only contact you if the application is not approved.

5. "I don't have a cable to hook my computer to the STU."

These generally are standard RS-232/RS-449 cables used with computer equipment. If you can't acquire one locally, most computer stores or Radio Shacks will carry them (and they are less than 10 bucks).

4. "I don't have communications software so my STU or STE can link to the DDS."

If you are running any version of MS Windows, you already have it. Windows operating systems ship with an embedded, user-friendly communication package named "Terminal" or "Hyperterminal."

3. "I don't have a modem to connect with the DDS."

A STU or STE is a secure type 1 modem, and is approved for classified connectivity to DDS or SIPRNET. You do not need an external modem. In some cases, you may have to remove the modem from the computer for the STU / STE to work.

2. "I'm computer illiterate."

All is not lost. There has to be someone in your organization who knows about these "byte things" and would be happy to help. DDS access and reprogramming operations do not require individuals with degrees in Computer Science.

1. "I don't have a reprogramming kit."

This one is the easiest of all to solve—CECOM SEC ECB distributes all reprogramming kits. Just contact them at DSN 992-9395/9392 (cmcl [732]532-) or order via Internet http://www.sec.army.mil/arat .

Our mission is to help you get "the right ASE stuff" to improve your Unit's survivability and/or lethality. If the Top Ten list above answered your questions, that's great. If not, please give us a call, because our team really wants to help. And—we can always use new "excuses" for our Top Ten List. ■

Flexible, Cost-Effective, COTS-Based TDOA Systems

Submitted by Larry Lashine, CECOM SEC

The Communication and Electronics Command (CECOM) Software Engineering Center (SEC) and SPAWAR Systems Center-San Diego, Code 272 (SSC-SD-C272) and SSC-SD PMW-189 are part of the Joint Development Technology Insertion Working Group (JDTIWG). This working group meets informally to look at emerging technologies within the Department of Defense (DoD) and how these technologies can be leveraged by all the DoD services.

As part of a JDTIWG session, SSC-SD-C272's US Coast Guard (USCG) Support office gave a briefing on its National Distress and Response System Modernization Project (NDRSMP). NDRSMP has a basic direction finding (DF) capability but no Time Difference of Arrival (TDOA) based geolocation function.

CECOM SEC briefed the JDTIWG on a PC based TDOA simulation package under development at the SEC software development facility. This simulation package was used to support the Army's Guardrail/Common Sensor (GR/CS) Systems, which features a precision Geolocation TDOA/ FDOA subsystem.

SEC enhanced the PC based simulation package, which evolved into the system SEC is proud to present as the PC Based Geolocation System (PCGS). PCGS is designed to operate within the SSC-SD-C272's Land Based Test Facility (LBTF), and places a special emphasis on capturing USCG distress calls for a demonstration for SPAWAR.

The demonstration consisted of four receiver locations at Camp Pendleton, Point Loma, San Clemente Island, and Otay Mountain in California. The receivers acquired their timing from GPS receivers and were networked together. Upgrades to the mapping feature will be added to improve editing and zooming capabilities. Other enhancements, with the objective to improve overall performance and functionality, are planned, as well.

The system was installed and became operational at all five sites in January of 2002. Encouraged by the demonstrated TDOA performance and capabilities of PCGS, SSC-SD-C272 approved the continuation of the system's development and testing efforts at its LTBF in San Diego in the hope that these efforts might prove valuable to the USCG and other services and government agencies. Since installation, this system has been in continuous 24/7 operation with no problems reported.

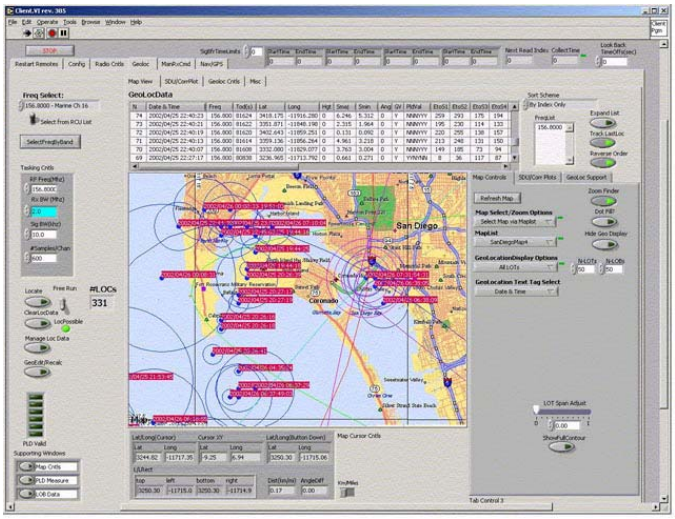


Figure 1. PCGS GUI featuring Marine Band with timetags.

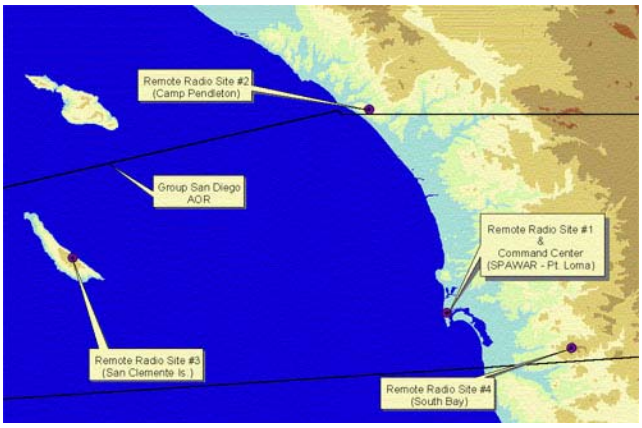


Figure 2. PCGS base station/remote access.

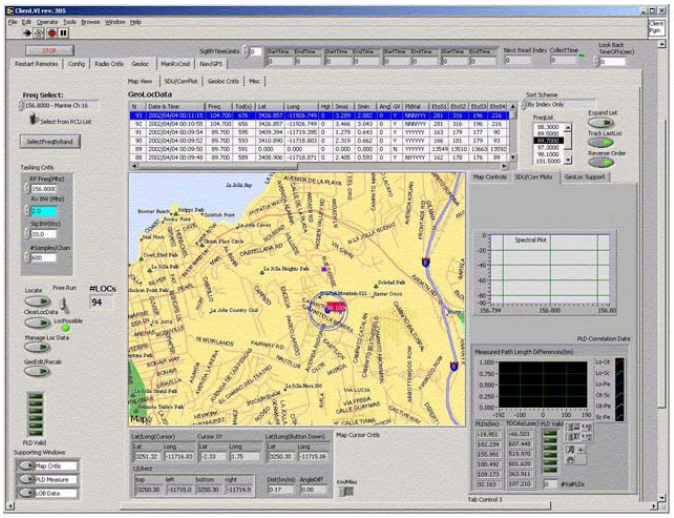


Figure 3. FM radio geolocation illustrating a TDOA fix.

Continued on page 11

(Continued from page 10)

SEC firmly believes that the PCGS configuration can support a multitude of customer requirements for TDOA capabilities. SEC can tailor the PCGS for specific customer requirements and hardware selection. We cite the reasons as follows:

- Upgradeable to next-generation processors
- Logistically sustainable
- Easily integrated with other geolocation systems
- User friendly, utilizing a flexible GUI (Figs. 1 and 3)
- Engineered *entirely* in LabView programming language

The PCGS system architecture consists of one control base station site and three or more remote station sites. A typical PCGS configuration is displayed in Figure 2. Communication is through industry standard TCP/IP.

The Base Station site features:

- Synchronous control of operations and activities at all four remote sites via an Ethernet LAN interface
- Capabilities to request signal intercept data from the remote sites, process the received data, and compute Lines of TDOA (LOTs) and geolocation fixes
- On-screen mapping and display of LOTs and resulting fixes on an operator selected "base map"
- Receiver tuning/control by Radio Control Unit MMI (Man Machine Interface), including the ability to load, modify, and save frequency lists
- Spectral Display Unit, signal/time, and pair wise cross correlation results received from remote site signal data
- Audio monitoring from any selected remote site
- Display of Line-Of-Bearing (LOB) data from USCG Advanced Concept Technology Demonstration (ACTD) system on PCGS maps
- Administrative access to and from remote sites for software maintenance, error recovery, and updates

The Remote Station sites (Figs. 4 and 5) feature:

- Response to commands issued from the Base Station site at SPAWAR
- Receiver tuning
- I/O to GPS receiver
- Echotek card control and I/O to digitize, filter, disseminate, and collect RF signal data from receiver
- The ability to collect, digitize, and pass audio signals from receiver to Base Station site
- Down-linking of data from Base Station site via 64 Kb/sec Ethernet connection for software maintenance, error recovery, and updates

The CECOM SEC currently supports the PCGS software baseline with an experienced team of software engineers whose primary responsibility is to ensure that the newly developed system is functionally sound and that any newly established requirements are easily implemented.

Additionally, SEC and SSC-SD-C272 have established an informal and cooperative working relationship, which has already resulted in increased exposure to and interest in PCGS across a broad spectrum of potential users. For example, there is much interest in PCGS to be interoperable with the Navy HITS program.

Potential applications include drug interdiction missions, and fixed site Intelligence and Electronic Warfare (IEW) applications such as the Demilitarized Zone in South Korea. This broadens the application of this technology to other IEW systems to support the Warfighter.

The flexible, commercial off-the-shelf based, and rapidly deployable nature of the PCGS architecture makes it ideal for new and challenging environments. PCGS is yet another example of SEC's continual dedication to produce high quality, innovative, cost-effective software solutions in support of PM Signals Warfare and PEO-IEW. ■

Figure 4. San Clemente remote station equipment.

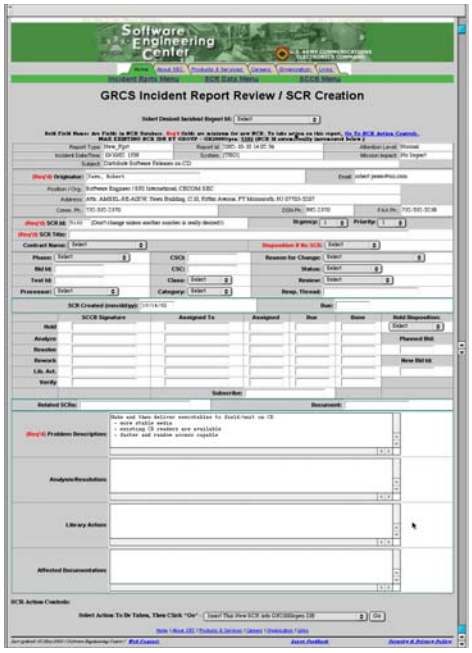
Figure 5. Coast Guard operations in existing land base facility.

SEC employed internal resources across divisions in the spirit of Lean Thinking in the implementation of the secure wide area network necessary to bring together the geographically distributed parts of the team. The CMBE remote distributed user capability is being implemented by SEC's Army Interoperability Network (AIN) group. The planned AIN nodes will enable GR/CS System 2 contractor experts, the user, and SEC field support personnel at the 15th Military Intelligence (MI) Battalion (Bn) (AE), III CORPS, Fort Hood, Texas, to have configuration-managed access to the latest release of the source code and the centralized development environment at SEC, Fort Monmouth, New Jersey. Nodes are operational at SEC and SRI International, Menlo Park, California, and the node at Northrop Grumman/ Mission Systems, Sacramento, California, is currently being implemented.

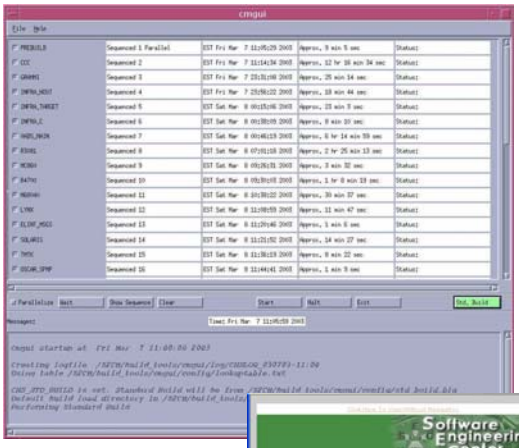
The GR/CS System 2 CMBE provides all the basic functionality for the approximately 4 million lines of code included in the delivered software baseline. In addition, the GR/CS System 2 CMBE incorporates several features to enable cost-effective support of the GR/CS System 2 baseline:

- A design of check-out/check-in scripts and procedures, tailored user account privileges, and managed development work areas (sandboxes) serves to accommodate multiple contractor and government teams requiring access to the CMBE for development or CM build services, while ensuring tight CM control.
- Remote access provisions, via AIN, permit expert developers located in various parts of the country to access the central CMBE much as though it were local.
- Change management is provided via a secure web-server based database and user interface, permitting authorized local and remote developers and Unit personnel to submit field incident reports, enter and manage system change requests, and provide reports and tools for the Software Configuration Control Board (SCCB).
- CM builds are semiautomated by a "Build Monitor" and Graphical User Interface (GUI), which enables the GR/CS System 2 code manager to manage and automate the dozens of shell and compiler make scripts.
- As compared with the GR/CS System 2 prime contractor's original CM environment, SEC's GR/CS System 2 CMBE employs fewer, more powerful servers to centralize and simplify support by operating system, avoids the cost of establishing separate CM and development environments, and reduces the baseline build turnaround time.

The GR/CS System 2 model for central multiuse CM and Test/IV&V (Independent Verification and Validation) facilities at depots connected in a cost-efficient collaborative network with technical experts and users around the country may find application for other high tech systems supported by SEC. ■



GR2000 field incident report review/SCR creation form.



Build monitor user interface.

GR/CS System 2 FIR menu and opening page of SCR database website.

SEC Guardrail Branch Supporting 15th Military Intelligence Battalion (AE) in Southwest Asia

(Continued from page 1)

SEC FSE support activities have touched almost every subsystem and chassis of the Guardrail payload. A number of key accomplishments by the SEC FSE while deployed forward have contributed significantly to Unit readiness and mission optempo. Selected accomplishments include the following:

- Pre-flight Hard Disk Drives (PHDDs) are critical mission software and mission file loading devices for the payloads. Within the first few days of arriving, the SEC FSE had not only placed all PHDDs back in service, but he employed the SEC-provided PHDD Docking Station to duplicate PHDDs in about 15 minutes each, and he has instituted a PHDD quality tracking program to determine which disks are experiencing more file system errors.
- The Mobile Maintenance Van (MMV), which supports a number of maintenance and pre-flight software loading functions, was down and unused by the Unit at the time the SEC FSE arrived forward. Within less than two weeks after arriving, the SEC FSE corrected disk and related software problems on the Unix workstations and brought the MMV back up to full functionality.
- One of the most challenging and urgent requirements that the Unit wanted the SEC FSE to solve was the existence of reoccurring firmware failures in the General Purpose VME (GPV) processors used in the payload for various critical processes, including Electronic Intelligence (ELINT), Low Probability of Intercept (LPI) and On-Board Processing (OBP). Failure of one of these cards leads to a payload being effectively inoperative until replaced or repaired, and the depot repair cycle required several weeks for shipment, correction, and return. The SEC FSE worked with the SEC payload PPSS team to obtain the software and adapt the requirements for reflashing the GPV programmable read only memory (PROM) in the field. The SEC FSE successfully brought GPV cards back on line. This accomplishment alone will save the Unit weeks of payload downtime during the current deployment.

The 15th MI Bn (AE) has expressed the opinion that they are fortunate to have such skilled and dedicated support personnel working with them. ■

Deployed GR/CS System 2–RC-12Q aircraft. First DoD Class 5 Air-to-Air and Air-to-Satellite Relay System.

Deployed GR/CS System 2–RC-12P aircraft.

TAS—Mobile Training Team Executive Summary

(Continued from Page 5)

To accomplish this mission, MTT conducts an initial assessment of the Unit's ability to employ the ASAS. The Unit's mission, incoming data (COMINT, ELINT, IMINT, HUMINT, MASINT, OSINT, etc.), and outgoing products are examined by the team's highly experienced instructors/analysts. The assessment also looks at the individual, the leader, and the collective skills of the entire organization, as well as the communication architecture, information architecture, and information shaping techniques that are required to produce timely, relevant, intelligence products. The results of this training assessment are discussed with the Unit's leaders. A group of Unit-specific, "battle focused," task lists are developed to address deficiencies. These task lists (which form the basis for all MTT training) are expanded to include the specific conditions under which each task must be completed, and a definitive, observable training standard is established. All MTT instruction is evaluated based on the training standard. Following each training event, a reassessment is made of all training plans to ensure an up-to-date approach.

Personnel who successfully complete MTT training have the requisite skills to participate in the resolution of intelligence questions immediately, and can be expected to complete complex analytical tasks correctly the first time. Skills derived from MTT training events are designed to enhance the analyst's ability to accomplish his or her specific mission. The MTT has developed highly successful ASAS training programs for the G-2 Analysis and Control Element (ACE) Chief Course, the Military Intelligence Captains Career Course (MICCC), the ASAS Master Analyst Course (AMAC), and the ASAS Instructor Certification Course (AICC), to name a few. In fact, MTT training has so impressed its recipients that US Army Intelligence School leaders (and cadre) frequently consult the group on ASAS training strategies for officer, warrant officer, and NCO training at Fort Huachuca as well as for the entire force. ■

(Continued from page 8)

The AHUD (Fig. 1) is an Advanced Electro-Optical System integrated with the Night Vision Goggle (NVG). The system senses critical flight data (i.e., altitude, airspeed, attitude, torque, compass heading) and sends the data to the NVG. The data are overlaid on the NVG imagery to provide the pilot and co-pilot with integrated night scene and critical flight data symbology. This results in significant operational advantages and survivability enhancements when performing night missions.

The AHUD system has the ability to process pilot and aircraft inputs and to display symbology for the following Army helicopters:

- UH-60A & L
- CH-47D & CH-47D (Improved Engine)
- UH-1H & V
- MH-47E & MH-60K

The software has been developed using Microsoft Visual Basic 6.0 and has been tested with Windows 98 and 2000 as target systems. An additional capability of the software is a Training mode which can be run in a classroom setting without any hardware connected. In this mode, an instructor can familiarize pilots and logistics support personnel with the look and behavior of the AHUD display (depicted in the HUD Window shown in Fig. 2).

The UTS has been designed in a modular fashion to allow it to support requirements changes to the AHUD as well as the next-generation system known as the Advanced Symbol Generator (ASG) currently undergoing qualification testing.

By developing this UTS system, CECOM SEC has demonstrated the ability to create an operational PPSS test environment when no suitable solution was commercially available. As stated previously, the ANVIS HUD UTS was a joint effort between the PM office and CECOM SEC. ■

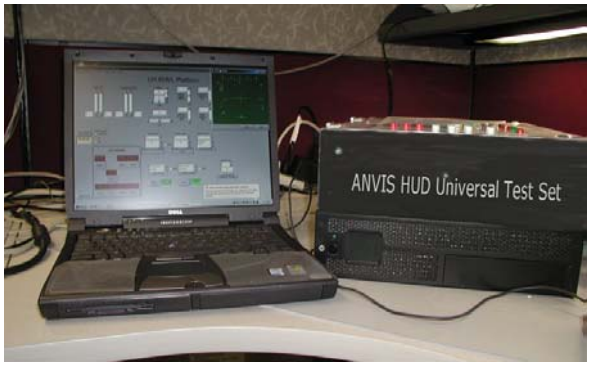


Figure 1. UTS system comprised of laptop PC and AHUD signal stimulus chassis.

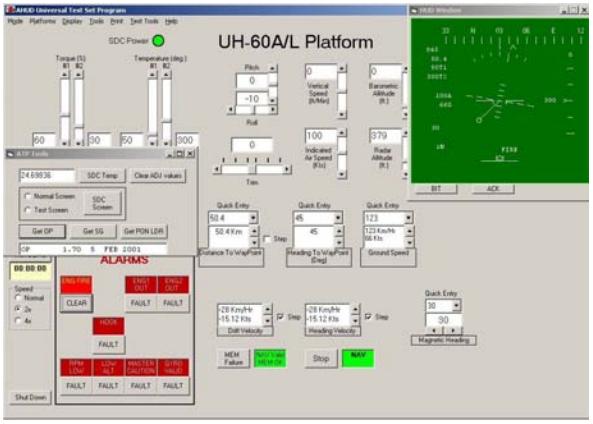


Figure 2. UTS graphical user interface.

Bahrain FMS Support

Submitted by Ray Singer, CECOM SEC

The Fire Support Software Engineering (FSSE) division, Automation Support Branch, System Support, Test and Fielding Team continues its support of Multiple Launch Rocket System Fire Direction System (MLRS FDS) and Battery Computer System (BCS) fieldings and training for the Bahrain Defense Force (BDF) in support of Foreign Military Sales case BA-B-UGR.

The SEC, FSSE Center completed training of MLRS FDS software to the BDF in late October 2002. A hardware installation team, headed by the FSSE government training team lead, completed installation of four AN/GYK-37 (Lightweight Computer Unit [LCU]) computers in the MLRS Battery and three MLRS Platoon M577 Fire Direction Center (FDC) vehicles.

The FSSE is completing development of a BCS FMS training program to be presented to the BDF 155MM and 8-inch cannon battalions beginning in mid May 2003. Operator training to personnel from the two battalions is planned for five to six weeks (including a CPX/FTX at the end). Installation of six LCUs in six battery FDC HMMWVs (three for each battalion) will be scheduled for the fifth or sixth week of training. ■

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Mr. John Amoretti
(DSN: (312) 992-0303/CML: (732) 532-0303) (john.amoretti@mail1.monmouth.army.mil)

or R^2CIL
(DSN: (312) 992-9395/9392/CML: (732) 532-9395/9392) (ARAT@ems.sed.monmouth.army.mil)

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Coming Events

Event/Sponsor	Location	Dates
40th Annual AOC International Symposium & Conference	Dayton, OH	21–24 September 2003
AUSA Annual Meeting	Washington Convention Center, Washington DC	6–8 October 2003
Command, Control, Communications, Computers and Intelligence Technology	Ft. Huachuca, AZ	7 October 2003
MILCOM 2003	Seaport Hotel Complex	13–16 October 2003
Homeland Security Conference	Atlantic City, NJ	15–19 October 2003

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